When Verbs Share Their Power: The Case of the German Light Verb Construction

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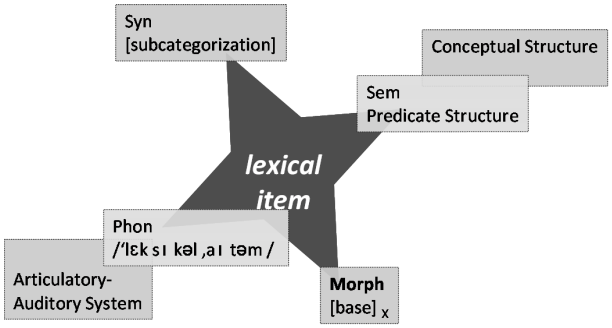
1 Foundations: The Representation-Processing Connection

- **Representation**: LTM level of instantiation of language:
  - Internal articulation: subsystems;
  - Units and principles of each subsystem.
- **Processing**: Dynamic instantiation with constraints of its own:
  - input/output is serial;
  - comprehension is incremental.
- **Basic Unit**: The lexical item as an interface system



  - Representation of lexical items:
    SYN: *syntactic information*
    CS: *conceptual information*
    SEM: *SYN-CS interface*

Sentence Composition: multilevel integration of lexical items according to each subsystem's set of rules.

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2 The Light Verb Construction:

A Compositional Problem:

Consider

(1) The man took an orange.

(2) The man took a walk.

In both examples, *take* licenses four semantic arguments:
<AGENT, THEME, GOAL, SOURCE>
The deverbal noun *walk* invokes the argument of the source verb:
<AGENT>
Consequently:

(3) The man took a walk. ≈ The man walked.

COMPOSITIONAL PROBLEM:
no 1:1-correspondence between semantic and syntactic arguments!

Argument Sharing:

– Representational information relevant for the formation of Light Verb Constructions:

take:	**SYN:**	V [_NP (PP)]
	CS:	EVENT
		ACHIEVEMENT$_{<\text{AGENT,THEME,SOURCE,GOAL}>}$
	SEM:	Pred$_{event}$<ARG, ARG, ARG, ARG >
walk:	**SYN:**	NP [_]
	CS:	EVENT
		ACTIVITY$_{<\text{AGENT,PATH,TIME}>}$
	SEM:	Pred$_{event}$<ARG, ARG, ARG >

- Argument Sharing results in:

(4)	*take a walk*:	**SYN:**	V [$_N$P (PP)$*$]
		CS:	EVENT
			ACTIVITY$_{<\text{AGENT,PATH,TIME}>}$
		SEM:	Pred$_{event}$<ARG, ARG, ARG >

- Argument Sharing...

  ... is rooted in syntax and semantics

  ... is triggered by mismatch between semantic roles and syntactic arguments

  ... is a "recycling" process: no semantic roles added.

Hypotheses:

- **Non-Compositional:** LVCs are stored in the lexicon as a whole. (Goldberg (1995), Family (2008), Michaelis & Ruppenhofer (2001))
- **Compositional:**
  (Cattell (1984), Grimshaw & Mester (1988))
  - **syntax-driven**: composition occurs via syntactic structure alone (Saito & Hoshi (2000)).
    → immediate implementation
  - **SEM-CS driven**: composition results from integration of two argument structures (Culicover & Jackendoff (2005), Piñango et al. (in press)).
    → slow to develop implementation

3 Two Processing Studies

3.1 Methods:

- **Interference Method:** Higher processing cost associated with slower reaction times (Van Dyke & McElree 2006, Gordon et al. 2001, Shapiro et al. 1989).
- **Time Course:** Syntactic effects immediately observable, semantic effects at around 300ms after the critical region (Boland 1996, McElree & Griffith 1995, Piñango et al. 1999, Swinney & Smith 1994).

3.2 Experimental Conditions:

3.2.1 English (Piñango et al. (in press)):

(5) LIGHT: Mr. Olson **gave an order** last night to the produce guy.

(6) HEAVY: Mr. Olson **typed an order** last night for the produce guy.

(7) DARK: Mr. Olson **gave an orange** last night to the produce guy.

3.2.2 German:

[LIGHT]

(8) Als die Mutter ihrem Sohn für den Schulausflug **die Erlaubnis gab**, war
When the mother her son for the school.excursion (the) permission gave, was
dieser schon genervt von ihren ständigen Ermahnungen.
he already annoyed by her repeated admonitions.
When the mother gave her son permission for the school excursion, he was already annoyed by her repeated admonitions.

[HEAVY]

(9) Als die Mutter ihrem Sohn für den Schulausflug **die Erlaubnis reichte**, war
When the mother her son for the school.excursion the permission handed, was
dieser schon genervt von ihren ständigen Ermahnungen.
he already annoyed by her repeated admonitions.
When the mother handed her son the permission for the school excursion, he was already annoyed by her repeated admonitions.

[DARK]

(10) Als die Mutter ihrem Sohn für den Schulausflug **die Thermoskanne gab**, war
When the mother her son for the school.excursion the thermos.flask gave, was
dieser schon genervt von ihren ständigen Ermahnungen.
he already annoyed by her repeated admonitions.
When the mother gave her son the thermos for the school excursion, he was already annoyed by her repeated admonitions.

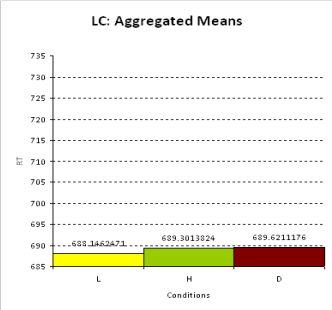
3.3 Predictions:

- **Non-Compositional:**
  - **At LC:**
    LIGHT < HEAVY, DARK
  - **At LC+300:**
    LIGHT < HEAVY, DARK
- **Compositional:**
  - **syntax-driven**:
    - **At LC:**
      LIGHT, DARK > HEAVY
    - **At LC+300:**
      LIGHT = HEAVY = DARK
  - **SEM-CS driven**:
    - **At LC:**
      LIGHT = HEAVY = DARK
    - **At LC+300:**
      LIGHT > HEAVY = DARK

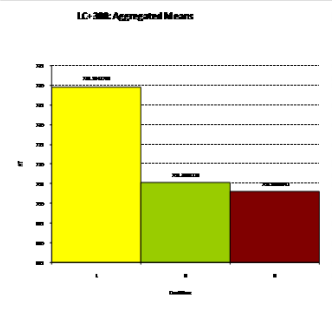
4 Results:

4.1 German:

LC : **No significant difference:**
RT_L vs. RT_H vs. RT_D: F(2, 816) = 0.08, p=0.91)



LC+300 : **LIGHT significantly slower than HEAVY and DARK:**
RT_L vs. RT_H vs. RT_D: F(2, 798) = 3.23, p= 0.04)
RT_L vs. RT_H: F(1, 532) = 4.64, p= 0.03)
RT_L vs. RT_D: F(1, 532) = 4.87, p= 0.03)



4.2 English: Corresponding results

LC : **No significant difference:**
DARK= 634.43 ms vs. LIGHT= 619.15 ms [t(19) = -2.01, p<.03, one-tailed].
HEAVY= 618.40 ms vs. LIGHT= 619.15 ms [t (19) = .112, p=.456 (one-tailed)].

LC+300 : **L > H, L = D:**
LIGHT = 664.44 ms > DARK = 659.04 ms, [t(19) = .634, p=.267 (one-tailed)];
LIGHT = 664.44 ms > HEAVY = 645.51 ms, [t(19)=2.46, p=.012, one-tailed].

5 Discussion

On the basis of these results, we cannot reject the SEM-CS hypotheses.

- Argument sharing as the product of Sem-CS composition active during sentence comprehension (psychologically real)
- Results consistent with architectures that allow
  - for SEM-CS representation to be connected to syntactic representation at the lexical level *(verbs & their concepts)*
  - for composition to take place along with, yet independently from, syntactic composition.

Implication:
Syntax and SEM-CS are independently compositional.

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